

# **INSTRUCT-O-GRAM**

## **SUB FLOOR RESCUE TECHNIQUES – PART II**

September 2004

By: Timothy E. Sendelbach

**Hose Slide Method** - If a hoseline is available in the immediate area, rescuers can utilize the hoseline to gain immediate access to the downed/trapped member. The hoseline is simply lowered into the hole/opening, then held in position by surface rescue personnel as a secondary rescue crewmember wraps his/her arms and legs around the hose (below the floor/ceiling joist) and slides the hose in a manner similar to that of the customary fire pole.

Alternative methods of anchoring the hose may be used if minimal rescue personnel are available including: Placing a coupling in a doorjamb and closing the door. By placing the coupling behind the door, the door becomes the catch point, thereby holding the hose in place. Personal webbing or rope can also be used by tying a hitch around the hoseline and anchoring the webbing or rope to a hand tool or wall stud (See anchoring systems).



### **SKILL SHEET - 2**

#### **GAINING ACCESS - HOSE SLIDE METHOD**

**Introduction:** A Safety Engine/RIT crewmember locates a downed/trapped member who has fallen through a floor and is trapped in the sub floor below. These are the steps that need to be addressed to gain access to the victim(s) below using a hose slide method.

##### **ACTIVITY STEPS:**

1. Safety Engine/RIT Crewmember notifies Command and Safety Engine/RIT Crew Officer that he /she has located a downed/trapped member – provides specific location of victim (i.e. Victim is trapped in Subdivision 1, Sector A).
2. Request simultaneous exterior rescue operation to include: Search for secondary access points, exterior wall breach if applicable, etc.).
3. Upon arrival of sufficient personnel (and confirmation of a means of egress – i.e. ladder, rope, etc.) rescuer proceeds to make access to the sub floor.
4. Rescuer lowers the hoseline into the hole.
5. Surface rescuer(s) stabilize the hoseline via additional crewmembers, doorjamb or rope/webbing tied off to a supportive anchoring device (i.e. hand tool, wall stud, etc.).
6. Rescuer wraps his/her arms and legs around the hose line below the floor/ceiling joist to avoid being crimped beneath the hose and floor/joist assembly.
7. Rescuer clears his/her cylinder and slides the hose line using a customary “fire pole” approach, enabling him/her to descend to the floor below.

##### **\*CAUTION:**

**No member should enter the sub floor unless a means of egress has been established.**

8. Sub floor rescuer evaluates downed firefighter(s) air supply (ABC method):
  - a. Air exchange

- b. By-pass/Purge valve
  - c. Cylinder gauge/valve – if air supply is exhausted, secondary air supply established.
9. Sub floor rescuer assesses for potential entrapment, entanglement, etc.
  10. Surface crewmembers prepare necessary equipment/personnel to initiate rescue action plan.
  11. Sub floor rescuer applies extraction device: MAST, handcuff knot(s), carabineer, etc.
  12. Firefighter(s) is pulled up and out of the hole (nose pointing in the direction of removal) – using two-four surface rescuers.

**Rope Slide Method** - To gain access via a rope or webbing slide, the rescuer should first tie off to a suitable anchor (or if subsequent crewmembers are available, they can hold the rope as the rescuer descends into the opening). The rescuer should then sit at or near the edge of the opening, pass the rope/webbing under one arm, around the cylinder (mid-cylinder preferred) and under the other arm. The rescuer grabs both sections of the rope or webbing with both hands (Palms up) just beneath the floor joist or ceiling assembly of the room he/she is about to descend while rolling into the hole, gently releasing his/her grip to control the speed of the descent.



### SKILL SHEET - 3

#### GAINING ACCESS - ROPE SLIDE METHOD

**Introduction:** A Safety Engine/RIT crewmember locates a downed/trapped member who has fallen through a floor and is trapped in the sub floor below. These are the steps that need to be addressed to gain access to the victim(s) below using the rope slide method.

#### ACTIVITY STEPS:

1. Safety Engine/RIT Crewmember notifies Command and Safety Engine/RIT Crew Officer that he /she has located a downed/trapped member – provides specific location of victim (i.e. Victim is trapped in Subdivision 1, Sector A).
2. Request simultaneous exterior rescue operation to include: Search for secondary access points, exterior wall breach if applicable, etc.).
3. Upon arrival of sufficient personnel (and confirmation of a means of egress – i.e. ladder, rope, etc.) rescuer proceeds to make access to the sub floor.
4. Surface rescuer(s) stabilize the rope/webbing via additional crewmembers or supportive anchoring device (i.e. hand tool, wall stud, etc.).
5. Rescuer threads the rope/webbing under his/her left arm, around the cylinder (mid cylinder positioning preferred), and under his or right arm.
6. Rescuer grabs both ropes with both hands (palms facing upwards) just below the floor joist/ceiling assembly.

#### \*CAUTION:

**No member should enter the sub floor unless a means of egress has been established.**

7. Rescuer performs a left or right lateral roll into the hole to enable his/her cylinder to clear.
8. Sub floor rescuer evaluates downed firefighter(s) air supply (ABC method):
  - a. Air exchange

- b. By-pass/Purge valve
  - c. Cylinder gauge/valve – if air supply is exhausted, secondary air supply established.
9. Sub floor rescuer assesses for potential entrapment, entanglement, etc.
  10. Surface crewmembers prepare necessary equipment/personnel to initiate rescue action plan.
  11. Sub floor rescuer applies extraction device: MAST, handcuff knot(s), carabineer, etc.
  12. Firefighter(s) is pulled up and out of the hole (nose pointing in the direction of removal) – using two-four surface rescuers.

### **EXTRACTING THE DOWNED/TRAPPED MEMBER(S)**

Extracting a victim or victims from a sub floor is by far one of the most labor-intensive operations any Safety Engine/RIT crew will endure. Strict discipline and a well-coordinated approach are absolutely critical.

As an absolute minimum, two or more rescuers should be available as surface rescuers anytime a firefighter(s) attempts to perform a sub floor rescue operation. CAUTION: No member shall be allowed to enter the sub floor until a means of egress has been established (i.e. rope, ladder, etc.). Once sufficient personnel are available, one rescuer should access the sub floor via ladder, rope slide, hose slide or if necessary be lowered by surface rescue personnel. Upon locating the downed/trapped member the sub floor rescuer should immediately initiate one of the aforementioned sub floor rescue techniques (i.e. MAST, Handcuff, Carabineer, etc.) while carefully coordinating his/her efforts with the surface rescue personnel.

Surface rescuers upon being signaled or instructed by the sub floor rescuer should begin to pull upward on the rope in a coordinated manner. Each pull should end with a second rescuer or back up member holding tension while the two primary members reach for a second grip. At the same time the subsurface rescuer should attempt to guide or direct the downed/trapped member through the hole as he/she is lifted upward.

## **SKILL SHEET - 4**

### **EXTRACTING THE DOWNED/TRAPPED MEMBER**

**Introduction:** A Safety Engine/RIT crewmember locates a downed/trapped member who has fallen through a floor and is trapped in the sub floor below. These are the steps that need to be addressed to properly extract the victim(s) from the sub floor.

#### **ACTIVITY STEPS:**

1. Safety Engine/RIT Crewmember notifies Command and Safety Engine/RIT Crew Officer that he /she has located a downed/trapped member – provides specific location of victim (i.e. Victim is trapped in Subdivision 1, Sector A).
2. Request simultaneous exterior rescue operation to include: Search for secondary access points, exterior wall breach if applicable, etc.).
3. Upon arrival of sufficient personnel (and confirmation of a means of egress – i.e. ladder, rope, etc.) rescuer proceeds to make access to the sub floor.
4. Rescuer lowers the hoseline into the hole.
5. Surface rescuer(s) stabilize the hoseline via additional crewmembers, doorjamb or rope/webbing tied off to a supportive anchoring device (i.e. hand tool, wall stud, etc.).
6. Rescuer wraps his/her arms and legs around the hose line below the floor/ceiling joist to avoid being crimped beneath the hose and floor/joist assembly.

7. Rescuer clears his/her cylinder and slides the hose line using a customary "fire pole" approach, enabling him/her to descend to the floor below.

**\*CAUTION:**

**No member should enter the sub floor unless a means of egress has been established.**

8. Sub floor rescuer evaluates downed firefighter(s) air supply (ABC method):
  - d. Air exchange
  - e. By-pass/Purge valve
  - f. Cylinder gauge/valve – if air supply is exhausted, secondary air supply established.
9. Sub floor rescuer assesses for potential entrapment, entanglement, etc.
10. Surface crewmembers prepare necessary equipment/personnel to initiate rescue action plan.
11. Sub floor rescuer applies extraction device: MAST, handcuff knot(s), carabineer, etc.
12. Firefighter(s) is pulled up and out of the hole (nose pointing in the direction of removal) – using two-four surface rescuers.

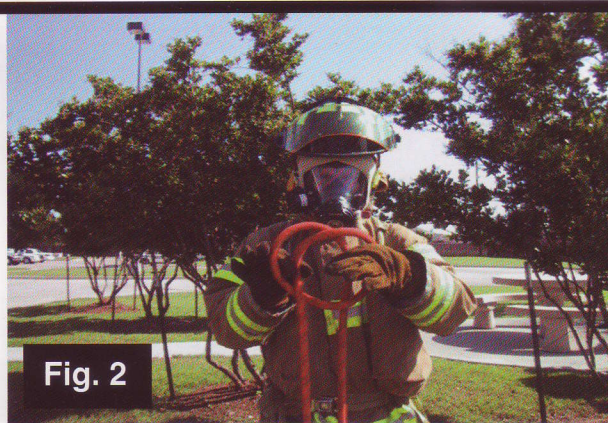
### **HANDCUFF METHOD:**

The handcuff knot is the most notable (most frequently taught) method of removing a downed/trapped member(s) from a sub floor. To tie the handcuff knot, simply form two loops approximately one third of the way down the rope (Fig. 1). By placing the knot approximately one third of the way down the rope, you can potentially tie a second handcuff knot the same distance from the opposing end allowing four rescuers to assist in the extraction process. Pull the left side of the right loop through the left loop while pulling the right side of the left loop through the right loop (Fig. 2-4). Pull both loops simultaneously in opposing directions to tighten the knot effectively (Fig. 5). The established loops (cuffs) should now be placed on the victim's arms or legs dependent on the situation (Fig. 6).

***CAUTION: It is extremely critical that the loops/cuffs be placed just below the elbows and/knees of the victim, this will allow the knot/cuffs to cinch down properly without placing undue stress on the joints of the victim.***



**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**



**Fig. 5**



**Fig. 6**

## SKILL SHEET - 1

### HANDCUFF KNOT - TRADITIONAL

Introduction: A firefighter is located through a hole in the floor below the rescuers. He/she has to be brought up through the same hole. These are the steps that need to be addressed in the approximate/suggested order.

#### ACTIVITY STEPS:

1. Rescuer confirms personal safety – collapse/stability survey, fire impingement, etc.
2. Rescuer attempts to assess victim(s) status (Alert, unconscious).
3. Rescuer attempts to assess victim(s) needs (AIR, WATER, EXTRACTION)
4. Rescuer request additional assistance – personnel, equipment, etc.
5. If victim cannot assist with self-rescue - \*Rescuer should consider gaining access below via ladder, rope or specialized equipment upon arrival of additional crewmembers.

**\*CAUTION:**

**No member should enter the sub floor unless a means of egress has been established.**

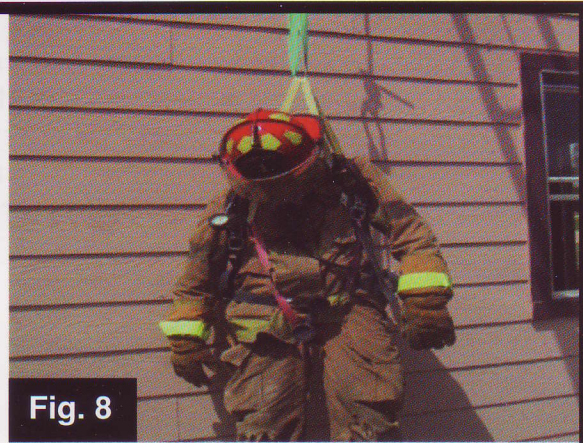
6. Rescuer gains access below via ladder, rope or specialized equipment.
7. Sub floor rescuer assesses situational needs—area stabilization (structural collapse, fire, etc.)
8. Sub floor rescuer evaluates downed firefighter(s) air supply (ABC method):
  - a. Air exchange
  - b. By-pass/Purge valve
  - c. Cylinder gauge/valve – if air supply is exhausted, secondary air supply established.
9. Sub floor rescuer assesses for potential entrapment, entanglement, etc.
10. Surface crewmembers prepare necessary equipment/personnel to initiate rescue action plan.
11. Sub floor rescuer applies extraction device: rope, MAST, etc.
12. Firefighter is pulled up and out of the hole (nose pointing in the direction of removal) – Practice using two and four rescuers.

### **MUTIPLE APPLICATION SERVICE TOOL (M.A.S.T.) METHODS:**

1. Standard application (Fig. 7-8):
  - a. Apply red loops to legs of victim
  - b. Apply yellow loops to the arms/shoulders of the victim
  - c. Attach rope/carbineer to the green loop and prepare to raise the victim. A carbineer can be attached to the both yellow loops for smaller statured victims.
  - d. Attach a rope or rope w/carabineer to the green loop and prepare to raise the victim.
  - e. Direct the victim out of the hole using his/her feet.
2. Extremity hitch (Fig. 9-10):
  - a. Fold red loop over itself and grab the remaining section of the loop to create a quick hitch, attach to the victims arm or leg.
  - b. Repeat the process with the remaining red loop on the opposite arm or leg.
  - c. Attach a rope or rope w/carbineer to the green loop and prepare to raise the victim.
  - d. Direct the victim out of the hole using his/her feet.
3. Extremity hitch w/backboard and ladder method:
  - a. Place an attic ladder/scuttle ladder into the hole – exaggerated slant if possible.
  - b. Attach the MAST tool to the backboard by weaving the red loops through the upper hand holes of the backboard.
  - c. Apply red loops to the victim's arms via the hitch method, role the victim onto the backboard - facedown.
  - d. Move victim to the base of the ladder (use surface rescuers to assist in moving the victim if at all possible).
  - e. Guide the backboard onto the ladder; direct the victim and board up the ladder. In cases where access is limited, it may be necessary to loosen the SCBA straps of the victim to allow the victim to pass through the hole.



**Fig. 7**



**Fig. 8**



**Fig. 9**



**Fig. 10**

## SKILL SHEET - 2

### M.A.S.T. TOOL METHOD

Introduction: A firefighter is located through a hole in the floor below the rescuers. He/she has to be brought up through the same hole. These are the steps that need to be addressed in the approximate/suggested order.

#### ACTIVITY STEPS:

1. Confirm personal safety – collapse/stability survey, fire impingement, etc.
2. Rescuer gains access below via ladder or rope.
3. Rescuer evaluates downed firefighter
4. M.A.S.T. Tool is applied (using harness method or wrist/foot hitch method)
5. Rescue rope is attached (Using a standard carabineer)
6. Firefighter is pulled up and out of the hole (nose pointing in the direction of removal) – Practice using two and four rescuers.

### S.C.B.A. CARABINEER MEHTOD:

One of the most simplistic methods of extracting a downed/trapped member from a sub floor is to simply attach a carabineer to his/her S.C.B.A. as a lifting mechanism (Fig. 11). Prior to directing the surface rescuers to lift, the subsurface rescuer should first disconnect the victims SCBA waist belt and pass the belt between the legs of the victim (thereby creating a seat harness) and reconnect the waist buckle (Fig. 12).



Fig. 11



Fig. 12

### SKILL SHEET - 3 S.C.BA. CARABINEER METHOD

Introduction: A firefighter is located through a hole in the floor below the rescuers. He/she has to be brought up through the same hole. These are the steps that need to be addressed in the approximate/suggested order.

#### ACTIVITY STEPS:

1. Confirm personal safety – collapse/stability survey, fire impingement, etc.
2. Rescuer gains access below via ladder or rope.
3. Rescuer evaluates downed firefighter
4. Rescuer attaches carabineer to S.C.B.A. harness assembly
5. Rescuer creates seat harness utilizing S.C.B.A. waist strap
6. Firefighter is pulled up and out of the hole (nose pointing in the direction of removal) – Practice using two and four rescuers.

#### **\*CAUTION:**

This method may not be appropriate with certain types/brands of S.C.B.A.'s.  
Check with your manufacture for specific recommendations.

Training using this method should be conducted using a belay system to ensure participant safety.

#### SUMMARY:

Sub floor rescue operations have previously been looked upon by firefighters across the country as a rarity, uncommon in nature. Unfortunately, our most recent history has provided a dramatically different viewpoint. As firefighters, officers and fire instructors, we must take action to ensure that we properly prepare for this type of incident.

As we continue our aggressive efforts of interior firefighting, we must also consider the rapid deterioration of structural stability that undoubtedly awaits us. Structural collapses have risen dramatically over the past five years and the number of firefighter fatalities as a result of these collapses continues to soar as well. Our

proactive preparations for sub floor rescue operations were previously viewed as rarity on the modern fireground; yet, the tragedies of our recent past shine a different light on the subject. The solution to this unrelenting reality is high quality, focused training, coupled with a well-disciplined crew that is willing to overcome all boundaries while ensuring the safety of its members.

Lets learn from the past in hopes of preventing or avoiding similar tragedies in the future.

### **DEDICATION:**

In conclusion, I would like to dedicate this series to the memory of Acting Lieutenant John Nance (Columbus Fire Department, Ohio), Firefighter Jim Heenan (Verga Fire Department, New Jersey) and William "Doc" Ellison III (Miami Township Fire Department, Ohio). This program is respectfully dedicated in their honor in hopes of preventing similar tragedies in the future.

Your efforts throughout your career have been heart felt; yet, the lessons learned from these incidents will be shared with many to ensure your lasting legacy, as "TRUE HEROS" will always be.

### **NEXT MONTH:**

In Part III of Sub Floor Rescue Techniques we will present two hands-on training programs and a written evaluation on sub-floor rescue operations.

### **PROGRAM DEVELOPER:**

Timothy E. Sendelbach - Tim is a 19 - year student and educator of the fire & emergency services, currently serving as Chief of Training for Savannah Fire & Emergency Services, Georgia. Chief Sendelbach formerly served as Assistant Fire Chief for Missouri City Fire & Rescue Services, Texas and as a Firefighter/Paramedic with the Kansas City, Kansas Fire Department. Tim has earned B.S. degrees in Fire Administration, Arson and an A.S. degree in Emergency Medical Care from Eastern Kentucky University.

Tim is the editor of the International Society of Fire Service Instructors (ISFSI) monthly publication *The Instructor* and a contributing editor to numerous other publications including the *Fire & Emergency Television Network* (FETN) in which he is the writer/developer of the featured "SURVIVAL!" program.

Tim is currently the President of the ISFSI, and a student of the National Fire Academy's Executive Fire Officer (EFO) Program.

### **CONTACT INFORMATION:**

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# **INSTRUCT-O-GRAM**

## **SUB FLOOR RESCUE TECHNIQUES – PART III**

October 2004

By: Timothy E. Sendelbach

### **Hands-On Training:**

#### **ACTIVITY NO. 1**

##### **(Step 1)**

Review the provided skill sheets followed by hands-on instruction of each sub floor rescue technique.

##### **(Step 2)**

Utilizing an acquired structure or pre-constructed training prop, simulate a firefighter has fallen through a hole in the floor.

#### **SAFETY NOTE:**

*No less than two (2) members should be assigned to Safety (one on the floor of operation and one below to ensure the safety of those involved. Additional precautions should include a method of belaying any rescuer enters the hole and the downed/trapped member as he/she is lifted out of the hole.*

##### **(Step 3)**

Instruct a crew of four (4) to five (5) members to locate the downed/trapped member utilizing the methods described and initiate the proper rescue action plan.

##### **(Step 4)**

Evaluate the participant's performance based on the following:

1. Operational safety
2. Appropriateness of actions (i.e. search operations, rescue action plan, crew coordination, etc.
3. Timeliness of actions
4. Crew continuity and reporting to Safety Engine Officer and/or IC.
5. Continued scene size-up, followed by proper revisions of the rescue action plan.

##### **(Step 5)**

Perform a post-course analysis, review, revise, and implement recommended changes modifications to the described techniques as necessary.

#### **ACTIVITY NO. 2**

##### **(Step 1)**

Utilizing an acquired structure or pre-constructed training prop, simulate (using synthetic smoke – visibility should be reduced to incorporate/require the use of a thermal imaging camera for rescue operations) a reported structure fire with a firefighter trapped in a basement. The trapped firefighter should be placed beneath a hole in the floor in full

protective clothing including SCBA (donned and flowing air – PASS activated) with various debris strewn upon him/her to simulate a collapse situation.

**SAFETY NOTE:**

*No less than two (2) members should be assigned to Safety (one on the floor of operation and one below to ensure the safety of those involved. Additional precautions should include a method of belaying any rescuer enters the hole and the downed/trapped member as he/she is lifted out of the hole.*

**(Step 2)**

Assign an Incident commander and a designated Safety Engine/RIT Crew (Four (4) members).

**(Step 3)**

Have an interior crewmember transmit a "Mayday!" request, alerting the incident commander that a firefighter has fallen through the floor.

**(Step 4)**

Evaluate the participant's actions:

**Incident Commander**

- Method of Safety Engine/RIT Crew deployment
- Request for additional personnel, equipment, etc.
- Assignments of on scene personnel to support the rescue action plan
- Communications
- Resource management
- Accountability of on scene personnel

**Safety Engine/RIT personnel**

- Search operations/priorities
- Safe and effective equipment use (i.e. ropes, ladders, T.I.C., etc.)
- Situational size-up, stabilization, safety
- Rescue action plan – timeliness, effectiveness, safety

**Support personnel (Outside crews)**

- Tool staging
- Search for secondary means of access
- Outside rescue operations (Wall breaching, hoseline placement, ventilation, etc.)
- Forecasting of potential Safety Engine/RIT crew request

**(Step 5)**

Perform a post-incident analysis, review, revise, and implement recommended changes modifications to the established Safety Engine policy/program.

**EXAMINATION:**

This evaluation is based on the August/September 2004 Instruct-O-Gram Series on Sub Floor Rescue Techniques.

1. The John Nance incident occurred in what city?
  - a. Lakeworth, Texas
  - b. Denver, Colorado
  - c. Pittsburgh, Pennsylvania

- d. Columbus, Ohio
2. Anytime a sub floor rescue operation is attempted, outside personnel should immediately be assigned to do what?
    - a. Assess for a secondary means of access to the sub floor.
    - b. Begin staging tools for potential Safety Engine/RIT crew request.
    - c. Attempt a secondary rescue operation from outside (if applicable).
    - d. All of the above
  3. M.A.S.T. as described in this program is an acronym for what?
    - a. Mutual Aid Support Team
    - b. Multiple Application Service Tool
    - c. Mobile Air Supply Trailer
    - d. Military Anti-Shock Trousers
  4. When performing sub floor rescue operations, the easiest most simplistic method should be initiated. The most simplistic method of gaining access to a sub floor as described in this program (with the exception of interior stairs) is via:
    - a. Rope
    - b. Ladder
    - c. Hose
    - d. None of the above
  5. The most common technique previously taught for sub floor rescue operations was:
    - a. Handcuff knot
    - b. M.A.S.T.
    - c. Carabineer w/ rope
    - d. Clove hitch method
  6. According to the material provided, floor stabilization is of critical importance for rescuer safety. Safety Engine/RIT personnel can potentially stabilize a floor using:
    - a. Existing doors
    - b. Cabinetry and/or shelving materials
    - c. Tables or interior furnishings
    - d. All of the above
  7. When applying the handcuff knot on a victim, the knot should be placed:
    - a. Just below the elbow
    - b. Just below the knee
    - c. Both a and b are correct
    - d. None of the above
  8. The red loops of the M.A.S.T. tool when applied in the standard (full body) method are placed where?
    - a. On each leg, pulled up as far as possible to establish a seat assembly
    - b. Over each arm near the shoulder
    - c. Around the victim's wrist
    - d. Around the victim's waist

9. If rope is not available, what common item found on the fireground (as described in this program) can be used as a substitute?
- Stainless steel cable
  - Chains
  - Extension cords
  - Hose
10. Which of the following is the top priority in sub floor rescue operations?
- Floor stabilization
  - Gain access
  - Victim extraction
  - Rescuer safety

**EXAMINATION ANSWER KEY:**

- |      |      |      |      |       |
|------|------|------|------|-------|
| 1. D | 2. B | 3. A | 4. C | 5. C  |
| 6. D | 7. C | 8. D | 9. D | 10. A |

**PROGRAM DEVELOPER:**

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